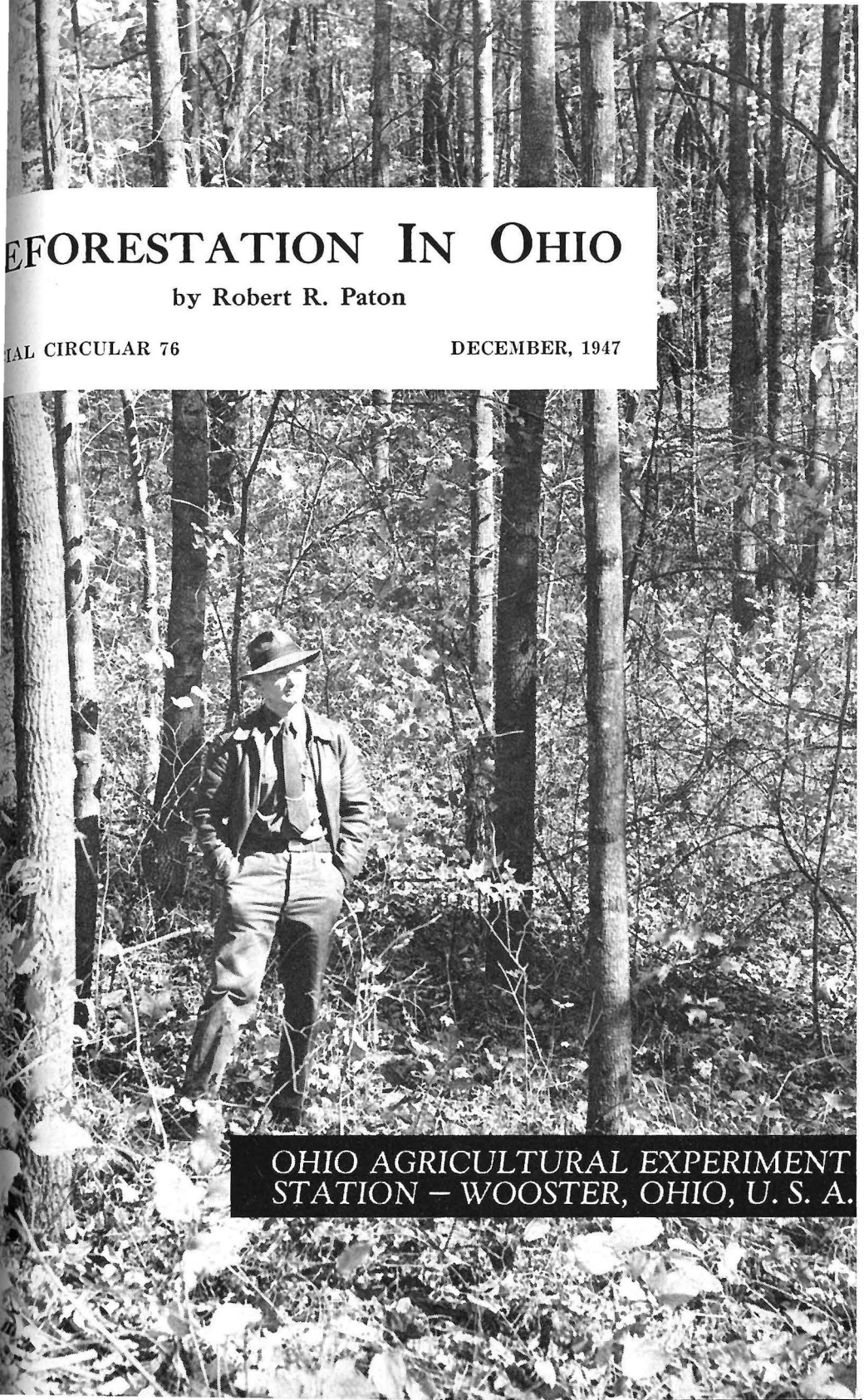

EFORESTATION IN OHIO

by Robert R. Paton

IAL CIRCULAR 76 DECEMBER, 1947

OHIO AGRICULTURAL EXPERIMENT STATION – WOOSTER, OHIO, U. S. A.

Reforestation In Ohio

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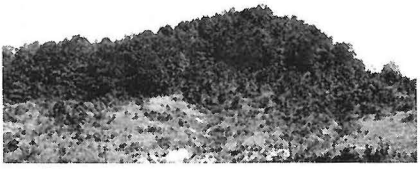


Fig. 1.—Natural seeding from the older forest is reclaiming this old field and planting will not be needed. Near Denver, Ross County, Ohio.

The need for more forests in Ohio is commonly recognized—forests to furnish a protective cover to steep hillsides, to retain rainfall, to shelter wildlife, to cover unsightly banks, as well as to provide lumber and other wood products. Timber is a renewable resource and it is certain to become increasingly important as our nonrenewable supplies of gas, oil, coal, and iron become increasingly difficult to obtain. Land that is lying idle or washing away should be returned to productive forests to meet future needs.

Many areas will return to forest growth naturally (fig. 1), but there is a great deal of land in Ohio which must be planted with trees, because of its distance from seed trees or because active erosion prevents small seedlings from surviving.

The Ohio Division of Forestry is interested in promoting the reforesting of all lands in the state which should be in forests, using the most economical and expedient method possible to reach this goal. Where it seems probable that natural means will accomplish this, it is recommended that they be allowed to do so. Careful cutting or thinning will aid in the process.

Where natural means apparently will not succeed within a reasonable time, planting is recommended. In many areas a long period will elapse before a forest will again grow, if natural reproduction is the sole method of reforesting. The purpose of this publication is to discuss replanting by artificial means where natural methods are proving inadequate.

Trees Distributed by the State

The Ohio Division of Forestry furnishes trees to landowners for the purpose of reestablishing forests on idle lands which should be in forest. The owner should determine whether he has such land and, if he has, whether it will revert to forest naturally within a reasonable length of time. Permanent protection from livestock is required where trees are obtained from the State.

Under natural reproduction, many years may be required to reach the desired result. If seed trees are very distant and site conditions extremely bad, it may require 100 years or longer. In such cases, planting is probably the best solution (figs. 2 and 3).

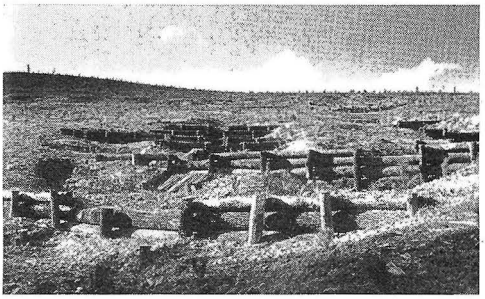


Fig. 2.—An eroded hillside near Clark (Coshocton County) a few months after Scotch pines were planted. The planting of trees has proved to be more effective in controlling erosion than the check dams.

Some land owners wish to plant a row of trees along the lane or around a field. Such a planting cannot be classed as reforestation since it will never constitute a forest. Trees for such plantings can only be classed as ornamentals and such stock must be secured from commercial sources. Christmas tree plantings are not classed as permanent forests and stock for such plantings must also be secured from commercial sources.

Land which lies within corporation limits cannot usually be maintained as forest land in the face of high taxes or potential subdivision and trees for planting on such land cannot be purchased from State nurseries.

Fig. 3.—This photo is of the same scene as figure 2, taken 13 years later. The trees have grown and encouraged the growth of other vegetation which gives good ground cover. One of the disintegrated erosion dams can be seen in the foreground.

The trees distributed by the State are sold for a nominal price, in quantities of 500 or more, to landowners who will agree to plant them on land they plan to return to permanent forest. Owners must protect them from livestock and make only such cuttings as are needed for the maintenance and improvement of the stand.

Application blanks for trees are available each year after September 1, and may be secured by writing to the State Forester, Ohio Agricultural Experiment Station, Wooster, Ohio, or by contacting the County Agricultural Agent.

How to Order Trees

Trees can be ordered only on the application blanks.

When ordering there are several things to keep in mind. Most important is the selection of the species to plant, but nearly as important is the number to order. This depends on the acreage to be planted and the amount of labor that will be available at the time of planting.

One man can plant between 350 and 500 trees per day. For example, if two men are available for only 2 days, not over 2,000 trees should be ordered.

The order should be sent in as early as possible in the fall to be certain of receiving stock early the following spring.

Selection of Species

The selection of species for reforestation purposes in Ohio must be based on several broad factors, chief of which are soil type, drainage, and present ground cover or vegetation. Each of these must be taken into consideration before the final choice is made.

Soil Type

Soils ranging from light gravel to moderately fine clay or clay loam have proven to be satisfactory for white and red pines, provided the other factors of drainage and ground cover are suitable.

The heavier soils are less satisfactory for the pines, especially white pine.[1] For such soils, red and white oaks and hard maple are the best. Hardy catalpa will grow well on such sites if fence post plantings are desired.

The deciduous species as a rule make their best growth on loams, clay loams, and moderately fine silty clay loams where drainage and ground cover are suitable. If the topsoil is thin and organic content is low, the deciduous species will not grow well and white or red pines should be used. Shortleaf pine is also well adapted to such soils in southern Ohio where they are not alkaline. Tuliptree is proving to be one of the best of the deciduous species for reforestation purposes where the soil is fertile or moderately fertile (fig. 4).

[1]Austrian pine will make fairly good growth on heavy soils, but this species has little other value in a reforestation program.

Black locust will survive and make some growth on very poor soils, but under such conditions the locust borer is likely to prove a serious factor. The trees attacked by the borer do not always die completely, but are useless for posts. The use of the locust for erosion control is still advisable, however, as the trees will be effective even though badly infested.

Black walnut should be planted on the more fertile, deep soils and in mixture with other species such as tuliptree, locust, maples, or oaks, for best results.

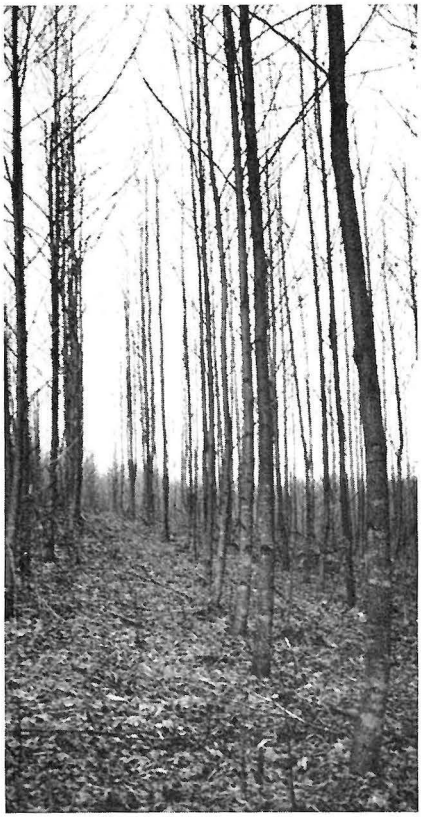


Fig. 4.—Eleven-year-old planting of tuliptree on farm of W. L. Armintrout, Piketon, Ohio.

Drainage

The factor of drainage is fully as important as soil type in selecting the species to plant. Sites which are dry or only moderately moist through most of the growing season should be planted with white or red pines or black locust, depending on soil type and cover. Sites which are moist most of the season, but not wet, should be planted with deciduous species.

Black walnut makes satisfactory growth on soils which are moderately moist, and tuliptree, American elm, catalpa, swamp white oak, and cottonwood also have proven satisfactory on such sites. Wet sites present a problem which cannot easily be solved although natural reproduction usually will restock the area with some species.

Ground Cover

The type of vegetation present at the time of planting should be considered in the selection of species. If the ground cover consists of a thin or moderately heavy sod, and the soil type and drain-

age are satisfactory, white, red, and shortleaf pines, or black locust will probably be the best species to use (fig. 5). If the sod is very heavy, the pines and black locust may still be satisfactory, provided some release from extreme competition is given by plowing furrows or removing the sod from a spot a foot or so in width, prior to planting (see page 9).

Fig. 5.—This field at the Belmont County Sanitarium was planted to trees by Boy Scouts in 1929, *left*, and made the growth shown at *right* in 17 years.

If the ground cover is composed of woody shrubs or trees, the planting of additional trees may be unnecessary or inadvisable, depending on the species and numbers of native seedlings present. Whenever there are seed trees nearby, volunteer seedlings will come into the field and in time will restock it if livestock and fire are excluded.

It is difficult to set any definite rules to guide the owner in judging whether he should plant a field that is beginning to restock naturally. The time element may be important in some cases and not in others. Many owners prefer to invest something in reforestation in order to hasten the establishment of a forest while others may find it impossible to invest any money in such projects.

If a rule were to be made, it would have to consider the number of native seedlings which are present and the length of time it took to get them established. No rule will always work, but the following might serve as a guide. If there are not more than 10 seedlings of trees per acre for each year that the field has been idle, natural methods are going to be too slow. For example, consider a field which has not been farmed for 10 years, but a count of seedlings shows less than 100 per acre. At that rate it will take many years to get a good natural forest, and planting is needed.

If there are 25 or more seedlings per acre for each year (for example, 250 seedlings in 10 years) such a field will probably restock in a reasonable time and should not be planted.

Such a count should not be made until at least 5 years have passed since farming or pasturing. Each acre should be considered separately, as a field may be so situated that a part of it will be restocked heavily and other parts not at all.

A cover of briars, while unpleasant during the planting operation, is not detrimental to most tree species and within a few years will usually be crowded out. Burning the field before planting makes planting easier, but the use of fire is highly dangerous and is detrimental to the soil.

White pine (fig. 6) is proving to be one of the best species to use in Ohio, but it should be used only under the conditions outlined above.

Fig. 6.—White pine planting at Waterloo State Forest.
See **figure 9 for close-up view of this planting.**

An additional factor must be considered in connection with this species. It is affected by a disease known as white pine blister rust which spreads by means of two hosts, one of which is the Ribes[2] family (currants and gooseberries) and the other is the white pine itself. If the intermediate host (currants or gooseberries) is eliminated the disease will not be present for it cannot com-

[2]Pronounced—Rybeez.

plete its life cycle. If the currants and gooseberries are removed from a protective zone of 500 to 900 feet around the pine planting, the disease cannot spread to the pines. Currants and gooseberries are commonly found in woods, fence rows, and swamps, and the planting of white pines near such areas will make the eradication of the Ribes plants necessary. A long, narrow planting requires a larger protective zone and consequently more work in eradicating the Ribes than if the same number of white pines are planted in a square block.

Mixtures

The best planting is usually a mixture of two or more species. Such a planting has a number of advantages over a pure stand, especially in the case of disease or insect attacks. Mixed plantings also are worthwhile where one species can be removed in early thinnings, leaving the other to comprise the final stand. In the case of black walnut, a mixture is needed as the walnut does not thrive in pure stands.

The selection of species to use involves the above-mentioned factors of soil, drainage, and ground cover but where conditions permit, the following are good mixtures:

Species	Method of mixing
White pine and red pine	Three rows of each species alternating or alternate rows.
White pine and tuliptree	Alternate rows.
White pine and pitch pine	Alternate rows.
Red pine and tuliptree	Alternate rows.
Tuliptree and black locust	Alternate rows or random mixture.
Black walnut and black locust	Alternate rows or random mixture.
Black walnut and red oak	Alternate rows or random mixture.
Black walnut and hard maple	Alternate rows or random mixture.

Spacing of Trees

Past results have shown that the best spacing is probably about 8 by 8 feet, requiring 680 trees per acre. With such a spacing, good survival is important and if less than about 400 to 500 trees have survived, replanting is advisable. If there are some native seedlings or trees present, they should be considered as part of the 400 to 500 needed per acre and the number of planted trees modified accordingly.

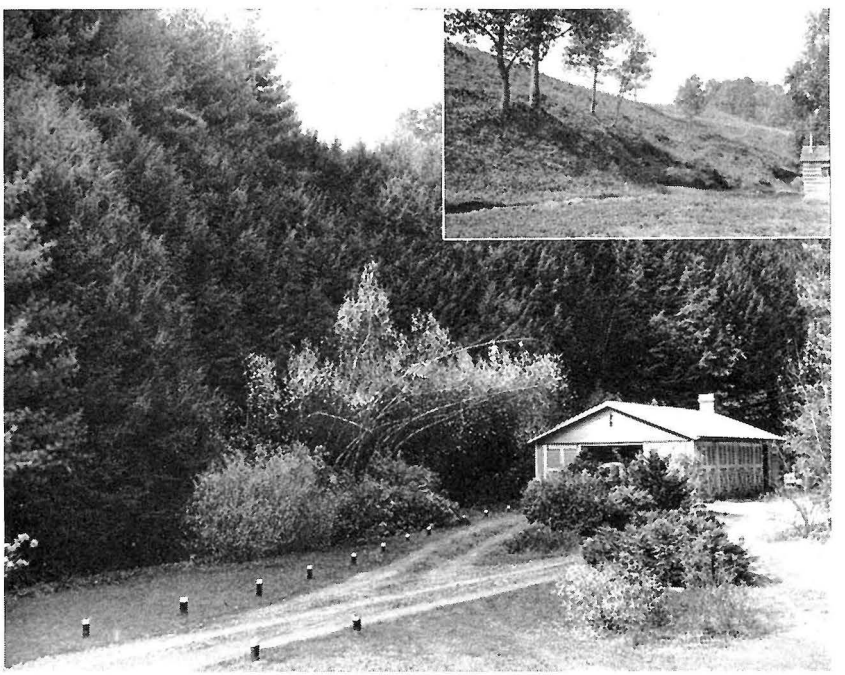
Furrowing and Scalping

The type of ground cover may make some furrowing or scalping necessary. If the sod is thin, the trees may be planted directly in the sod without any other treatments, but the young trees may be smothered in heavy sod the first season unless something is done to favor them by removing some of the competing growth.

The sod may be removed from a spot a foot or more across and the tree planted in the center of this scalped area. Where practicable, plowing shallow furrows is just as good and requires far less labor. The furrows should be at right angles to the prevailing winds in level land or along the contour of sloping land.

The best furrowing technique is that known as the contour ridge. This is done as follows: The first furrow is made along the contour, throwing the slice uphill. The next furrow is made by coming back, above the first furrow, turning the first slice and the soil beneath it downhill into the first furrow. This leaves the furrow on the uphill side of the slice and the trees are planted in the

Fig. 7.—It is not advisable to plow furrows when planting trees on steep banks. The hemlocks shown above were planted in the sod (inset-upper right) and have made the growth shown in the picture in 24 years.



slice. A dam of loose earth should be pulled into the furrow beside each tree, as these dams will check the flow of water along the furrow, allowing it to soak into the ground beside each tree, where it is needed most.

This plowing may be done the fall previous to planting in soils which are benefited by freezing and thawing, such as sands or clays, but where the soil has silt in it, spring plowing is best.

Management of Forest Plantings

The primary purpose of reforestation in Ohio is to return idle fields to permanent, producing forests. A permanent forest in Ohio is usually deciduous,[3] composed of several species—a mixed hardwood forest.

The area in question may have supported some of the finest oaks or ash in the state at one time, but the conditions under which those species grew no longer exist, and it is impossible to replant the area directly with oaks or ash with assurance of success. An intermediate step is required to restore the site to the conditions favorable to these species. This may be accomplished by planting those species which will survive the unfavorable conditions now present. The planted trees must be able to resist the freezing and thawing of the ground during the winter, the buffeting of cold winds and sleet and the damaging effect of late spring frosts. During the summer months they must survive drought and the high temperatures at the soil surface which commonly occur on exposed soils.

The pines will endure these conditions and still make good growth, but the oaks and ash will not. Tuliptrees will not do as well at first unless they have some sheltering nurse trees to protect them in early years.

[3]There are a few native coniferous forests of limited area in Ohio, and scattered forests of mixed deciduous-coniferous species, but for the most part the native stands are deciduous.

Following the planting of the pines, conditions begin to improve. The soil gradually becomes covered with a leaf litter, grass becomes less dense, temperatures do not go to the extremes they do on exposed ground, and the winds are tempered. Seeds begin to fall more frequently over the area as the pines check the velocity of the wind and wind-borne seeds drop among the trees. Birds roosting in the pines bring in seeds and squirrels find shelter in the young stand and bury some of their acorns and other seeds there.

Fig. 8.—Volunteer seedlings of tuliptrees coming into a planting of red pine. These volunteers constitute a valuable step in the reforesting of this field.

In short, under the young pine forest we begin to find volunteer seedlings of native species and we have the beginning of the mixed deciduous forest we hope to obtain (see fig. 8). These young hardwood seedlings soon begin to push their tops up into the sunlight and the planted trees may take second place. Many eventu-

ally become suppressed. They have played an important part in the regeneration of the forest, however, and may now be removed in thinnings. Many of the planted trees will continue to grow well and will produce marketable wood products. White pine, tuliptrees, black locusts, black walnuts, and shortleaf pines are all hardy and fast growing, and should produce merchantable timber.

Thinnings, the first of which will be needed in 15 to 20 years, should be aimed at two results; first, the hastening of the return of valuable native trees, and second, the securing of a profitable return from the planted trees.

Fig. 9.—Thirty-year-old white pine planting marked for thinning.

Technical assistance to the owner of these planted forests will be available at the time he needs it, from the Ohio Division of Forestry.

Tax Reduction on Forests

Further assistance is now available in the form of reduction of taxes on forested land where the owner is protecting it from livestock. Information regarding this tax reduction can be obtained by writing to the State Forester, Wooster, Ohio.

COVER—Thirty-year-old tuliptree planting at Dean State Forest.